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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,830	02/11/2004	Hardayal Singh Gill	HIT1P060/HSJ920030255US1	6165
50535	7590	11/14/2005	EXAMINER	
ZILKA-KOTAB, PC P.O. BOX 721120 SAN JOSE, CA 95172-1120			BERNATZ, KEVIN M	
			ART UNIT	PAPER NUMBER
			1773	
DATE MAILED: 11/14/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/777,830

Applicant(s)

GILL ET AL.

Examiner

Kevin M. Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☒ Claim(s) 2 and 12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/11/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

DETAILED ACTION

Drawings

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 12 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 2. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 and 4 – 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Hasegawa et al. (U.S. Patent App. No. 2004/0072021 A1) as evidenced by Parkin (Phys. Rev. Let., 67(25), 1991, 3598 – 3601).

Regarding claim 1, Hasegawa et al. disclose a magnetic head (*Title*) comprising a free layer (*Figure 1, element 28*) having an active area ("*central portion*") and tab regions on opposite sides of the active area ("*end portions*"), an AP coupling layer formed above the free layer, the AP coupling layer being formed of Ir (*element 29 and Paragraph 0119*), and a bias layer formed above each of the tab portions of the free layer (*element 30*), magnetic moments of the tab regions of the free layer being pinned antiparallel to the magnetic moments of the bias layers (*arrows in Figure 1*).

Regarding the limitation of the coupling strength (J_{exc}) in claim 4, it has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily or inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly or alternatively. Therefore, the *prime facie* case can be rebutted by

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evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

In the instant case, the Examiner notes that Hasegawa et al. requires that the two magnetic layers be antiferromagnetically coupled across the Ir nonmagnetic layer and that the nonmagnetic layer be relatively thin (*Paragraph 0175*). Parkin teaches that Ir layers form a J_{exc} of 1.85 erg/cm^2 at the first oscillation peak at around 3 Angstroms (*Figure 2 and Table 1, and entire disclosure*). Given that the peaks correspond to when antiferromagnetic coupling is observed (versus ferromagnetic coupling), the Examiner deems that the Ir layers used in Hasegawa et al. must necessarily possess a J_{exc} meeting applicants' claimed limitations since they are taught to be in a certain thickness range and must possess AP coupling characteristics.

Therefore, in addition to the above disclosed limitations, the presently claimed property of the coupling strength (J_{exc}) would have inherently been present because the nonmagnetic layers taught by Hasegawa et al. are limited to such a thickness, coupling ability and material that they would necessarily result in the claimed coupling strength.

Regarding claims 5 and 6, Hasegawa et al. disclose pinned layers meeting applicants' claimed limitations (*element 23 and relevant disclosure thereto*).

Regarding claim 7, Hasegawa et al. disclose using a Cu spacer layer meeting applicants' claimed limitations (*element 27 and relevant disclosure thereto*).

Regarding claim 8, Hasegawa et al. disclose multilayer free layers, including layers of NiFe meeting applicants' claimed limitations (*Paragraph 0276*).

Regarding claim 9, Hasegawa et al. disclose bias layers meeting applicants' claimed material limitations (*element 30 and relevant disclosure thereto*).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2 – 4, 11 – 20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. as applied above, and further in view of Parkin (Phys. Rev. Let., 67(25), 1991, 3598 – 3601).

Hasegawa et al. is relied upon as described above

Regarding claims 2, 3, 11 – 14 and 16 – 20, Hasegawa et al. fail to explicitly disclose using a coupling layer (either of Ir, or of another known AP coupling material) having a thickness meeting the claimed range.

However, Parkin teaches that Ir is a known equivalent to the other known AP coupling materials and that it is also known in the art that the thickness of AP coupling oscillates (*Figure 2, Table 1 and entire disclosure*).

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Given that Ir is a known material capable of exhibiting AP coupling and that the concept that AP coupling can occur at a variety of thickness values for these materials, it would therefore have been obvious to one of ordinary skill in the art at the time of the applicants' invention to modify the device of Hasegawa et al. to utilize an AP coupling layer meeting applicants' claimed limitations as taught by Parkin, since Ir is a known AP coupling material and the concept of varying the thickness to the various AP coupling peaks is known in the art.

Regarding claims 4 and 15, Parkin discloses that Ir has a coupling strength exceeding the claimed value and since the coupling strength is a material property, the Examiner deems that Ir AP coupling layers meeting applicants' claimed thickness ranges (which are taught by Parkin) would necessarily result in the claimed coupling strength.

Regarding claims 22 and 23, while Hasegawa et al. does not explicitly disclose the nominal magnetic apparatus limitations, the Examiner takes official notice that a magnetic storage system utilizing a magnetic media, a head for reading and writing to the media, a write element coupled to the sensor, a slider for supporting the head and a control unit coupled to the head for controlling operation of the head is well known in the art. The Examiner need only point to applicants' admissions (*Figure 3 and page 11, lines 15 – 18*) as evidence of the well known nature of the above nominal apparatus limitations.

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7. Claims 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. as applied above, and further in view of Fuke et al. (U.S. Patent No. 6,455,178 B1).

Hasegawa et al. is relied upon as described above.

While Hasegawa et al. disclose using CoFe for the free and bias layer, Hasegawa et al. fail to disclose using fcc CoFe material for the free and bias layer.

However, Fuke et al. teach that using fcc magnetic layers for exchange coupling can lead to embodiments having improved coupling when used with an fcc antiferromagnetic layer (*Hasegawa et al., element 31*), which will result in improved exchange coupling and “pinning” of the end regions (*Fuke et al. – col. 2, lines 45 – 55; col. 3, lines 44 – 53; col. 4, lines 24 – 65; and col. 6, lines 22 – 44*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant’s invention to modify the device of Hasegawa et al. to use fcc CoFe for the bias and free magnetic layer as taught by Fuke et al. since this will result in improved exchange coupling and “pinning” of the end regions.

8. Claims 1 – 7, 9, 11 – 18, 20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. (U.S. Patent No. 6,462,919 B1) in view of Parkin (Phys. Rev. Let., 67(25), 1991, 3598 – 3601).

Regarding claim 1, Mack et al. disclose a magnetic head (*Title*) comprising a free layer (*Figure 6A, element 208*) having an active area (“*track width portion*”) and tab regions on opposite sides of the active area (“*exchange tab structures*”), an AP coupling

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layer formed above the free layer (*elements 206A and B*), and a bias layer formed above each of the tab portions of the free layer (*elements 204A and B*), magnetic moments of the tab regions of the free layer being pinned antiparallel to the magnetic moments of the bias layers (*col. 8, line 34 bridging col. 9, line 12*).

Regarding claims 2, 3 and 11 – 14, Mack et al. fail to explicitly disclose using a coupling layer (either of Ir, or of another known AP coupling material) having a thickness meeting the claimed range.

However, Parkin teaches that Ir is a known equivalent to the other known AP coupling materials and that it is also known in the art that the thickness of AP coupling oscillates (*Figure 2, Table 1 and entire disclosure*).

Given that Ir is a known material capable of exhibiting AP coupling and that the concept that AP coupling can occur at a variety of thickness values for these materials, it would therefore have been obvious to one of ordinary skill in the art at the time of the applicants' invention to modify the device of Mack et al. to utilize an AP coupling layer meeting applicants' claimed limitations as taught by Parkin, since Ir is a known AP coupling material and the concept of varying the thickness to the various AP coupling peaks is known in the art.

Regarding claims 4 and 15, Parkin discloses that Ir has a coupling strength exceeding the claimed value and since the coupling strength is a material property, the Examiner deems that Ir AP coupling layers meeting applicants' claimed thickness ranges (which are taught by Parkin) would necessarily result in the claimed coupling strength.

Regarding claims 5 – 7, 9, 16 – 18 and 20, Mack et al. disclose the claimed material and structural limitations (*col. 8, line 34 bridging col. 9, line 12*).

Regarding claims 22 and 23, while Hasegawa et al. does not explicitly disclose the nominal magnetic apparatus limitations, the Examiner takes official notice that a magnetic storage system utilizing a magnetic media, a head for reading and writing to the media, a write element coupled to the sensor, a slider for supporting the head and a control unit coupled to the head for controlling operation of the head is well known in the art. The Examiner need only point to applicants' admissions (*Figure 3 and page 11, lines 15 – 18*) as evidence of the well known nature of the above nominal apparatus limitations.

9. Claims 8, 10, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mack et al. in view of Parkin as applied above, and further in view of Fuke et al. ('178 B1).

Mack et al. and Parkin are relied upon as described above.

Regarding claims 8 and 19, none of the above disclose a free layer formed on a layer of NiFe meeting applicants' claimed limitations. Regarding claims 10 and 21, while Mack et al. disclose using CoFe for the free and bias layer, Mack et al. fail to disclose using fcc CoFe material for the free and bias layer.

However, Fuke et al. teach that using fcc magnetic layers for exchange coupling can lead to embodiments having improved coupling when used with an fcc antiferromagnetic layer (*Mack et al., elements 202A and B*), which will result in

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improved exchange coupling and "pinning" of the end regions (*Fuke et al.* – col. 2, lines 45 – 55; col. 3, lines 44 – 53; col. 4, lines 24 – 65; and col. 6, lines 22 – 44). *Fuke et al.* further disclose free magnetic layers comprising a NiFe "core" layer surrounded by Co alloy layers in order to improve the exchange coupling force and soft magnetic properties of the layer (col. 6, line 23 bridging col. 7, line 25 and Examples 12 and 13).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Mack et al. to use fcc CoFe for the bias and free magnetic layer, as well as to use a free layer formed on a layer of NiFe as taught by *Fuke et al.* since this will result in improved exchange coupling and "pinning" of the end regions.

Conclusion

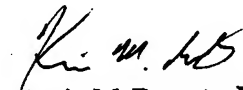
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
November 8, 2005


Kevin M. Bernatz, PhD
Primary Examiner